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## CONTENTS.


| REVIEWS: | Page. |
|---|---|
| Leitfaden zum Berechnen und Entwerfen von Lüftungs- und Heizungs-Anlagen—Ventilations- und Heizungs-Anlagen—Heizung und Lüftung von Gebäuden—Hilfstabellen zur Berechnung von Warmwasserheizungen. Reviewed by Wm. Paul Gerhard, M. Am. Soc. M. E. | 31 |
| A Treatise on Masonry Construction | 33 |
| Reinforced Concrete in Europe | 33 |
| Commissioner of Health (Pennsylvania) | 33 |
| Timbering and Mining | 33 |
| Mines and Methods | 33 |
| The Fundamental Principles of Chemistry. Reviewed by A. H. Sabin, Assoc. M. Am. Soc. C. E. | 34 |
| Sanitary Condition of New York Harbor | 34 |
| Irrigation Engineering | 34 |
| The Elements of Mechanics of Materials | 34 |
| Advertiser's Hand Book | 34 |
| Choosing a Vocation | 35 |
| Lighting Engineers' Handbook | 35 |
| Natural Sources of Power. Reviewed by F. C. Finkle | 36 |
| Bibliography of the Cotton Manufacture | 36 |
| Coaling, Docking and Repairing Facilities of the Ports of the World | 36 |
| British Engineers and Allied Professions in the Twentieth Century | 37 |
| Building Plans and How to Draw Them—A Simple Treatise on Architectural Perspective for Beginners—A Dictionary of Terms Used in Architecture and Building | 37 |
| Nicholson on Factory Organization and Costs. Reviewed by Harvey S. Chase and Clinton H. Scovell | 38 |
| Concrete in Railroad Construction—Concrete in Highway Construction—Concrete Construction about the Home and on the Farm | 38 |
| Metal Corrosion and Protection | 38 |
| Efficiency as a Basis for Operation and Wages | 39 |
| Oak Flooring | 39 |
| When Railroads Were New | 40 |
| The Figure of the Earth and Isostasy from Measurements in the United States | 40 |
| The City of the Dinner-Pail | 40 |
| PUBLICATIONS RECEIVED | 41 |


## REVIEWS.

### Three Standard German Books and a Pamphlet on Heating and Ventilation.

Reviewed by WM. PAUL GERHARD,* M. Am. Soc. M. E.

LEITFADEN ZUM BERECHNEN UND ENTWERFEN VON LUEFTUNGS- UND HEIZUNGS-ANLAGEN.—Ein Hand- und Lehrbuch für Ingenieure und Architekten. By H. Rietschel, Professor in the Royal Technical College at Berlin. Fourth edition, revised and enlarged. Berlin, Germany: Julius Springer. Cloth; 6⅛ × 9⅝ ins.; pp. 550; 92 illustrations in the text; 25 tables and 33 folding plates in separate volume, 6½ × 9⅝ ins. 24 marks; American price, $9.60.

VENTILATIONS- UND HEIZUNGS-ANLAGEN.—Mit Einschluss der wichtigsten Untersuchungs-Methoden. Ein Lehrbuch für Ingenieure, Architekten, Studierende, Besitzer von Ventilations- und Heizungsanlagen. By Ludwig Dietz. Munich and Berlin, Germany: R. Oldenbourg. Cloth; 5¼ × 8½ ins.; pp. 492; 231 illustrations, mostly in the text. 12 marks; American price, $4.80.

HEIZUNG UND LUEFTUNG VON GEBAEUDEN.—Ein Lehrbuch für Architekten, Betriebsleiter und Konstrukteure. By Anton Gramberg. Berlin, Germany: Julius Springer. Cloth; 6 × 9¼ ins.; pp. 397; 236 illustrations, mostly in the text. 12 marks; American price, $4.80.

HILFSTABELLEN ZUR BERECHNUNG VON WARMWASSERHEIZUNGEN.—Published by H. Recknagel. Munich and Berlin: R. Oldenbourg. Stiff paper; 9¼ × 13⅜ ins.; pp. 18; examples in pocket. 3 marks; American price, $1.20.

There is a wide and constantly growing interest in Germany in the subjects of heating and ventilation, and the importance which is being attached to these problems at the present time is perhaps best shown by the fact that within the brief period of less than four months three German text-books dealing with these subjects exclusively have been published.

The largest of the three books is the one by Prof. Rietschel. This is not a new work, but has come out in a fourth entirely revised and enlarged edition in two volumes. The first edition was brought out in 1893, and the fact that three more editions have been called for since then speaks well for the technical value of the book. Prof. Rietschel's work has indeed become so well known, not only among heating engineers, but among the engineering and architectural professions generally, that it is considered to be a "standard reference work." It deals both with the science and the practice of heating and ventilation, and while the author now occupies a prominent position as professor at the Royal Technical School at Charlottenburg, near Berlin, where he is also the chief of the testing station for heating and ventilating appliances, it should not be overlooked that for a good many years he was a practicing engineer, the heating firm of Rietschel & Henneberg being well and favorably known almost throughout Europe.

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By virtue of the extensive practical experience acquired by him in designing and executing works pertaining to the heating and ventilation of large buildings, Prof. Rietschel, perhaps better than any other man in his line of work, became qualified to prepare a text-book on this important subject. We learn, moreover, that his work was really the outcome of a suggestion or request of the Minister of Public Works in Prussia, who had occasion to become intimately acquainted with the high character of the work installed in important buildings, such as courthouses, hospitals, parliament buildings and others, by the firm named above.

In the preface to the first edition Prof. Rietschel states that he intended his book chiefly for the practicing engineer, and for this reason has somewhat restricted the amount of purely theoretical considerations. The revised edition gives due consideration to the most recent requirements in ventilation, but the largest amount of revision took place in the sections devoted to heating; in fact, the author states that it became necessary to rewrite these chapters entirely. In the second volume, which contains the numerous tables and plate illustrations, many of the tables have been revised and some new ones have been added.

The entire subject is handled with a view to aid the practical man, but there are interspersed theoretical considerations, formulas and calculations where these seem necessary for a proper understanding of the subject.

There are practically six sub-divisions, the first of which is devoted to ventilation, the second to heating, the third to cooling buildings. Other divisions discuss the methods of letting heating contracts and the principles and rules which should guide in competitions for heating and ventilating projects. An appendix presents in full the latest official regulations issued in Prussia, under date of April 29, 1909, for the planning, construction and maintenance of central-heating systems. There is also an excellent bibliography. The 25 tables, some of which are very long and complete, and the more than 300 illustrations referring to the various chapters have been gathered together in a second volume with 33 plates, the reason for this arrangement being the desire of preventing the book from becoming unduly bulky and difficult to handle, if issued in only one volume.

There are numerous illustrations relating to the proper location of air intakes, to different air filters and sprayers, to mixing arrangements for hot and cold air, and to exhaust fans and blowers, but these while interesting do not seem to require an extended notice as they do not differ much from American practice.

The division of the book pertaining to ventilation is very complete and brings the usual theoretical considerations on the air, on the necessity of ventilation, on the amount of air supply, the means and appliances for effecting a change of air, and details regarding the design, calculation and construction of ventilating systems. In several places notice is taken of the many improvements which have been made in the United States in this branch of the engineering sciences in the last decade.

Equally complete is the treatment of heating, which begins with a consideration of the usual fuels, and then goes very fully into the subject of heating units required for warming enclosed spaces, and the heat transmission through walls and windows. Before describing the various heating systems in detail, the author gives a brief general review of heating appliances, in which considerable attention is given to heating by gas stoves. As would be expected in a German book, the large tile or Dutch stoves, and combinations of iron and tile stoves, are considered at length as being still the usual means of warming German dwellings. But the author is fully aware of the limitations of these methods, and urges the many advantages obtained from centralized heating plants. To each of the methods of heating by warm water, by high and low-pressure steam, by combination systems, and warming by hot air a full chapter is given.

The treatment of the subject is thorough, clear, logical, practical and useful. In discussing the letting of heating contracts, the author argues against the common practice of giving the contract to the lowest bidder. His view is that while such a method might be all right and produce satisfactory results, where purchases of large amounts of materials of one kind are to be made, it cannot help being detrimental when it is intended to apply to special work, such as a heating system for a building which has to be constructed. In his judgment it is next to impossible to secure good, durable and efficient work when contract prices are unduly squeezed down as a result of general competitive bids, and by such methods owners of buildings are bound to suffer in the end.

By virtue of his official position, Prof. Rietschel has in numerous cases acted as consulting engineer and expert adviser, and in an interesting scoring card, based upon such experience, he gives data to be used in determining the best out of a number of heating projects submitted in competition. He also gives a number of valuable hints regarding examinations and tests of ventilating and heating systems.

Prof. Dietz is a former pupil and now the principal assistant of Prof. Rietschel at the testing station in Charlottenburg, and his book is dedicated to his teacher. In the preface to his book he explains that he undertook it at the suggestion of the publishers, who wished to bring out a short treatise on heating and ventilation, with special reference to the modern requirements of sanitation. We find accordingly that the author emphasizes in several places in the book the need of a thorough knowledge in sanitary matters on the part of heating and ventilating specialists. He also lays much stress upon the benefits which owners of manufacturing establishments actually derive by providing properly warmed, well-ventilated and sanitarily arranged factories and workrooms.

Another special feature of the Dietz book is the importance placed upon the methods of testing heating and ventilating systems, and upon the application and use of measuring instruments required in testing. In fact, his work may be considered to be largely the outcome of his experience while in charge of the testing station conceived by Prof. Rietschel, many of the results of the latter being embodied by permission in the book. Perhaps it should also be mentioned that the author attaches, and justly so, a great deal of importance to the proper maintenance of heating and ventilating appliances and to their periodical testing. In presenting the results of such investigations the author uses by preference the graphical method of representation.

Throughout the Dietz book we find numerous references to American examples, and the author points out their many practical features, though stating at the same time that he does not consider them superior from a mechanical or sanitary point of view to recent German systems.

There is quite a long introductory chapter containing historical notes and data, in some of which the author controverts the commonly accepted ideas regarding ancient methods of heating derived from a study of the works of Vitru-

vius. He then proceeds to lay down the fundamental hygienic requirements involved both in heating and ventilating buildings. What the reviewer likes, particularly about the Dietz book, is this almost constant reference to modern sanitation. Indeed, the author does not hesitate to state that he considers heating and ventilation as integral parts of the modern systems of hygiene; and to strengthen his position, as it were, he enumerates in detail all those subjects which a modern view of sanitary engineering ought to comprise. It is gratifying to observe that the author includes therein many important subjects which American sanitary and engineering journals, and American engineers practising sanitation, have either overlooked or purposely but wrongly excluded.

It is decidedly refreshing to find a German professor quoting extremely practical views on ventilation, like the following, which was originally uttered by von Pettenkofer: "Should there be a manure pile in a closed apartment, no sane person would think of trying to remove its offensive odor by means of ventilation; he would simply remove the manure pile." This may sound like a trite saying, but there is much more wisdom and sound practical advice in it than may appear at first blush. For does it not point out the fact that cleanliness and sanitation are fundamental requirements of the science of ventilation? Apply it wherever we may, to the ventilation of school rooms, of hospital wards, of chemical manufacturing establishments, of kitchens and laundries, we shall find out that the first and most important thing to do, the basis of all ventilation, is to remove the sources of bad odors. After this is done, provide for the required change of air in the best manner possible. To illustrate, it is greatly to the credit of the Germans that in schools they were the first to introduce bathing arrangements, such as the rain-bath, and thus by promoting bodily cleanliness of the pupils assisted in a very practical way in solving the problem of school room ventilation.

The reviewer quite agrees with the author when, in another place, he points out the fact that ventilation by windows alone is altogether insufficient, much as he appreciates the beneficial effect due to an occasional "air flushing."

The author acknowledges that the science of heating and ventilation received many valuable impulses from the United States, and is full of praise for the practical features of American systems, embodying the use of the electric current for running the ventilators, exhaust fans or pressure blowers, or the return pumps of the improved heating systems.

Four chapters of the Dietz book deal in an interesting manner with ventilating, and five with heating systems. Of the latter, the one discussing central stations for power, light and heat, is particularly valuable, for after referring to some American examples, he describes several recent German works, among them the district heating plant or as the Germans call it the "Fernheizwerk" constructed in Dresden in 1905, by the well-known firm of Rietschel & Henneberg, which supplies heat from a central station to the Royal Castle, the Royal Museum, the Opera House and about 17 other large public buildings.

Speaking of the relations between the building sciences and the subject of his book, he recommends that to obtain the best results architects should always cooperate with reputable heating experts.

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The third book, by Dr. Ing. Gramberg, who holds a professorship in the new Technical University at Dantzic, in West Prussia, was published almost simultaneously with the book by Prof. Dietz. In writing it, the author had two principal objects in view: (1) to furnish a textbook for architects, mechanical and sanitary engineers, giving the essential elements of the sciences of heating and ventilation in a strictly scientific, yet easily understood form; and (2) to provide a brief guide for the designers of heating and ventilating systems, which would also serve as a preparatory step for the study of the larger classical work of Prof. Rietschel already referred to.

Prof. Gramberg's work begins with a general review of the entire subject of heating and ventilation, which, however, occupies but five pages and appears to be rather short. The principal contents of the book are divided into a theoretical and a practical section. The three chapters of the first section bring general fundamental data on temperature, specific heat, properties of water, air and steam, on the calculation of pipe lines and conduits for water, air and steam, on the generation and transmission of heat, and on the combustion and calorific effects of the commonly used heating fuels.

The second and larger section of the work is devoted to the practical requirements of both heating and ventilation, and deals first with local heating appliances, such as coal stoves, fireplaces, oil and electric heaters, and next with the important central heating systems, the different forms of which are discussed in some detail. Speaking of warm-air heating, in which he includes, as is commonly done in Germany, not merely the heating by furnaces, but also the indirect-steam and hot-water systems, he points out that its arrangement is essentially identical with that of any ventilating system, with the one important difference that the air, instead of being introduced at a normal temperature is suitably warmed, hence imparts heat to the room instead of absorbing it, as does happen in a ventilating system introducing merely fresh air. Moreover, in the case of the larger buildings, it becomes necessary to distribute the warm air through flues by means of mechanical appliances, such as fans or blowers, which are more positive than the natural means for creating an ascending current in flues.

A chief difficulty in properly designing warm-air heating and ventilating systems consists, according to the author, in the well-known fact that the requirements for ventilation and for heating do not at all times coincide. For instance, the larger the number of occupants in an assembly hall, the larger will be the air volume required for ventilating purposes, while at the same time the number of heat units to be provided become smaller in an inverse ratio.

An important chapter of the book is the one devoted to recent heating systems, like the vacuum, the Reck and the Bruckner systems, as well as others in which the return flow or circulation is accelerated by the aid of pumps, thus making them more suitable for extended groups of buildings. Another chapter is devoted to the advantages and the drawbacks of district heating by steam or hot water. Several examples are given, among them that of an extensive group of hospital buildings of the sanatorium Beelitz, near Berlin, which contains a model plant well worthy of a visit of inspection as the reviewer can testify from personal knowledge and observation.

American heating engineers would doubtless be interested in a combination heating system, which is quite common in Germany, and in which high-pressure steam is utilized to warm the water of a hot-water heating system.

The last twenty pages of Prof. Gramberg's book are taken up with a description of the application of heating and ventilation systems to different kinds of buildings (dwellings, offices, schools, hospitals, theatres, churches, industrial establishments and horticultural buildings). This feature, which is entirely lacking in the other two books, might easily have been made one of very intrinsic value, and the author deserves praise for introducing it, but unfortunately it falls short of expectation by being incomplete and far too condensed.

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Summing up, it is rather difficult to form a conclusion which of the three works before us deserves the preference, nor does it seem really necessary to draw comparisons, for they possess each some features of considerable merit. Engineers specially devoted to the practice of heating and ventilating buildings would doubtless wish to possess in their working library the book of Prof. Rietschel, which is the most complete and up-to-date of its kind, and one with which no work written in the English language can compare. It is well known that British text-books on the subject fall short of our requirements, and successful American engineers are too busily occupied to write a handbook like that of Prof. Rietschel, though we do have several good smaller books, referring either to furnace heating exclusively or to steam-heating.

Of the two smaller books, to which this review refers, the reviewer would be inclined to select by preference the one of Prof. Dietz as being a useful and concise treatise for engineers and architects in general, one which emphasizes the sanitary needs of ventilation, while Prof. Gramberg's work would seem to be better adapted for those who wish to follow up the strictly scientific phase of the subject, without going into details as the book by Prof. Rietschel does.

Notwithstanding the fact that the American practice of warming buildings differs in many details from that of Germany, there are sufficient general rules and data of value in these books to render them useful to those American heating engineers who are familiar with the German language. Attention may in this connection be called to the fact that the climatic conditions of both countries are very much alike, and certainly much more so than those of England and the United States. A prominent American consulting engineer for heating and ventilation became aware of this fact early in his professional career and consequently adapted with considerable success in his business practice the standard German rules to American conditions. This fact is worth pointing out to those who incline to the belief that German technical works are not well adapted for use in our country.

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Another German publication relative to hot-water heating has followed the others. This is brought out by the well-known publishing firm of R. Oldenbourg, in Munich and Berlin, and consists of a collection of 33 tables intended as aids in the calculation of gravity hot-water heating apparatus. These tables have been prepared and partly compiled by H. Recknagel, an engineer of Munich, Bavaria, who makes a specialty of heating and sanitary installations and who is known as the editor of a very useful "Pocketbook for Sanitary and Heating Engineers," published annually, in October, by the same publishers, and is intended for use in calculating and installing ventilating and central heating apparatus, as well as bathing and other sanitary appliances.

Eight of the tables give the amount of heat radiation from heating surfaces, for low and medium-pressure hot-water heating; and one table gives heat units lost by exposed or uncovered heating pipes. Other useful tables relate to the coefficients of friction for pipe lines, to the calculation of the sizes of pipe lines, to the water capacity of heating boilers and of expansion tanks. A useful appendix brings examples showing the application of the tables.

These tables constitute a very useful supplement to the pocketbook by the same author. The typography is excellent, the figures are clear and easily readable, but the writer is inclined to criticize the unwieldy size of the tables, which even when used at the desk take up altogether too much room.

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TIMBERING AND MINING.—A Treatise on Practical American Methods. By William H. Storms. New York: McGraw-Hill Book Co. Cloth; 6 x 9½ ins.; pp. 279; 125 illustrations in the text. $2, net.

In 1892 the author of this book published a little volume entitled "Methods of Mine Timbering," which reached a large circulation as a bulletin of the State Mining Bureau of California. Its popularity led him to enlarge the scope of the work, so that it not only would contain a full description of timbering in underground workings, but also of other modern methods of removing ore in which timber is not used, or if used at all, at a minimum. So in this latest book, in addition to some very good chapters on the different kinds of timbering, illustrated by drawings and photographs of actual work, there are also chapters on steel timbering, and the various sorts of ore-workings in which timbering is not resorted to.

## An Entirely New and Revised Edition of Baker's Masonry Construction.

A TREATISE ON MASONRY CONSTRUCTION.—By Ira O. Baker, M. Am. Soc. C. E., Professor of Civil Engineering, University of Illinois, Author "Roads and Pavements," etc. Tenth edition, rewritten and enlarged. New York: John Wiley & Sons. London, England: Chapman & Hall, Ltd. Cloth; 5¾ × 9¼ ins.; pp. 745; 244 illustrations, partly in the text, and 100 tables. $5.

Nearly 20 years ago to a day from the date of this issue—on Oct. 19, 1889, to be exact—a review written by the late A. M. Wellington of the first edition of Prof. Baker's standard work on masonry appeared in this journal. With characteristic emphasis Mr. Wellington awarded this praise:

> We should be doing an injustice to both author and publisher did we not declare at once our conviction that this is the most valuable and complete treatise on masonry as yet published, at least in English. * * * If the author will keep at work on the same plan for the next few years, expanding this work on its present plan by additions of fresh practical material * * * it will make a work of quite unapproached value.

Since that time 26,000 copies of the book have been issued, a testimonial to the accuracy of the reviewer's estimate, and the revisions have gone through ten editions, proof of the appreciation on the part of the author of the wisdom of Mr. Wellington's advice.

In 1899 the growing importance of concrete demanded a rather complete revision of the portion of the book which treated that subject but with this exception the new editions have been confined to corrections of obvious errors and additional or explanatory paragraphs. Generally speaking the 9th edition did not materially differ from that of 1899.

Now, according to the author, the further great development of concrete in masonry has made necessary the complete rewriting of portions of the work, and opportunity has been taken to rewrite or thoroughly to revise the whole book. The 10th edition of Baker's Masonry Construction, therefore, while built on the skeleton of its predecessor, is practically a new book.

The changes in size of the 10th over the 9th edition involve the increase in pages from 556 to 745, in which the four main sub-heads are increased as follows: Part I., The Materials, from 80 to 103 pp.; Part II., Preparing and Using the Materials, from 102 to 202 pp.; Part III., Foundations, 128 pp., same page length; Part IV., Masonry Structures, from 204 to 262 pp. In addition to a general rearrangement and restating of the old matter and headings, these additional pages include new chapters on Reinforced Concrete, Concrete Building Blocks and Elastic Arch.

In a book of such size it would be quite impossible to review all of the changes and additions. In general it may be said that they are to the benefit of the book. In the first part on materials, discussions of the sand-lime brick and iron-ore cement are entirely new and the tables of strength are up-to-date. In the chapters on on mixing and proportioning mortar and concrete the latest papers have been abstracted and methods presented. Reinforced concrete is treated in a separate chapter. This treatment is, of course, nothing like as complete as that accorded the subject in books devoted to it alone, but is quite sufficient for the part that the material plays in ordinary masonry design, which is the field of the book. The reinforced-concrete skeleton construction hardly comes under the definition of masonry, and hence the omission of the details of such construction is quite justifiable. Concrete building blocks, however, are properly classed as masonry material, and the chapter on them is a desirable feature of the revision. Stone masonry has not changed much in the last 20 years, so the revision here has been of a minor nature.

In the new chapters on foundations the principal novelties are the paragraphs on soil bearing-power mainly taken from and accredited to Cortheil's admirable new book on the subject, and the portions on concrete piles and the improvements in caisson work. It is also interesting to note that in the latest edition all the reference to "rational" pile-driving formulas which filled a number of pages in the old books has been omitted, and the "Engineering News Formula" is accepted as the only reasonably approximate value for the bearing power of driven piles.

In the chapter on dams the structures which the U. S. Reclamation Service has been putting in for the past few years are given space, in addition to the former well-known structures described. In the part on retaining walls there is a remarkably competent review of the many theories on earth pressure and a rearrangement of matter so as to include the reinforced-concrete walls which have lately come into vogue. In bridge abutments and piers there is little that is new, except that once more concrete takes more space than in the older editions. The last chapters are on arches and culverts and include a discussion of the elastic arch, which is new to the book, though treated after the conventional manner. The book is completed with standard specifications for cement, concrete and masonry.

After a careful inspection of the new edition we see no reason to amend the opinion of Mr. Wellington. The book is still the "most valuable and complete treatise on masonry as yet published."

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REINFORCED CONCRETE IN EUROPE.—By Albert Ladd Colby. Easton, Pa.: The Chemical Publishing Co. London, England: Williams & Norgate. Cloth; 5¾ × 9 ins.; pp. 200. $3.50.

At the request of certain interests, not named in the book, Mr. Colby recently made a trip to Europe and there investigated the present state of reinforced concrete. His report to his clients was first printed in limited numbers for their use, but has now been put in book form for general circulation. In judging it, therefore, the nature of its preparation should be taken into account.

The author has searched thoroughly for his information. He has abstracted from books, government reports, trade and government specifications, and committee reports and has personally interviewed a number of European experts. All of these data have been collated, compacted and classified under several heads, such as economies of reinforced-concrete, endurance of concrete, foreign systems, mechanical bond, reinforcing metal, cement, and specifications for concrete and reinforced concrete. This portion of the report is therefore in the nature of a symposium, in which the opinions of the various contributors are reduced to the lowest terms. Such a collection is valuable as an indicaton of the trend of European practice, which is more extended, at least, than our own.

The rest of the book is mostly given over to lists of the various concrete systems now in use or on the market in Europe, and of the numerous individuals, committees, commissions, societies and laboratories engaged there in the study of the subject. The multiplicity of so-called systems is the bane of concrete construction abroad and we can see no use of recording them for American eyes. However, Mr. Colby's clients desired this information and its undue prominence in the book is due to that fact.

The report is closed by a very extensive and complete, but poorly arranged, concrete bibliography.

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COMMISSIONER OF HEALTH (Pennsylvania).—Second Annual Report. (Samuel G. Dixon, Commissioner.) Harrisburg, Pa.: Pub. Doc. Cloth; 6 × 9½ ins.; pp. 974; diagrams.

A vast mass of information bearing on health problems in Pennsylvania and efforts being made to solve them is given in this large and for the most part closely printed volume. The long delay in making the report public detracts largely from its value, except for purposes of record. Presumably this delay is in part incident to the great amount of work which has been required in building up almost from the foundations an organization for health-protective work, both comprehensive and detailed in character, and which promises to put Pennsylvania in the forefront of health-board work.

Among the special topics covered in the report may be mentioned a short account of tests designed to throw light on the possibility of the spread of tuberculosis by drinking water, a report on detection of the typhoid bacillus during the Scranton typhoid epidemic of 1906-07, and tests to determine the danger of fire in formaldehyde disinfection. The experiments on the conveyance of tuberculosis by water, although they are characterized in the report as affirmative as to possibility, hardly seem conclusive as to probability of infection by this means. The typhoid bacillus tests in connection with the Scranton epidemic are set forth in the report as being absolutely conclusive and as a marked contribution to bacterial science and to the control of the spread of typhoid through the public water-supplies. The conclusion as to the danger of fire where formaldehyde is used as disinfectant is that such a danger exists and should be guarded against, but that it is not so great as to make it necessary to abandon that method of disinfection—a conclusion which is certainly borne out by the records of hundreds of thousands of cases of formaldehyde disinfection in actual practice, with very few records of fire, so far as we have ever heard reported.

About half of the report in number of pages, and far more than that in volume of matter owing to the use of small type, is taken up by the report of the Division of Sanitary Engineering, Mr. F. Herbert Snow, M. Am. Soc. C. E., Chief Engineer. Besides a description of the organization and administration of the division and numerous reports on applications for the approval of plans for sewage-disposal and water-filtration plants and allied matters, Mr. Snow's report contains accounts of the Scranton typhoid epidemic of 1906-07 and of typhoid epidemics at Kittanning, Spangler and a few other places.

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MINES AND METHODS.—Vol. I., No. 1. Monthly publication. Salt Lake City, Utah: Claude T. Rice, editor and publisher. Paper; 9 × 12 ins., pp. 40; two half-tone insets and numerous text illustrations. Single copies 15 cts.; by the year, $1.00.

The field covered by this new mining monthly is to be restricted, according to the foreword in the initial issue, to metal mining. Coal mining will not be touched upon. In the field of metal mining, however, it purposes to cover both the operative and financial side of the business and to deal not only with mine operation and management but with the financing of mining companies, and even with methods of deceiving shareholders.

The five pages of editorials on Patrick Edward Connor, Utah's first mining man; handling of smelter fumes; steam-shovel mining; and the Utah Copper Co., are followed by illustrated articles on "The United States Smelter," "Mining Bingham Porphyry," "Mining and Milling at Ely," and "The Utah Copper Co." The first three articles are mainly descriptive of apparatus and methods of operation. The last is evidently of the financially exposing type hinted at in the foreword and deals in particular with the listing of 300,000 shares of the Utah Copper Co.'s capital stock upon the Paris Bourse.

The various articles are comprehensive, explicit and well-written and appear to be the work of one thoroughly familiar with the class of work described. A feature of the descriptions of plant operation is the inclusion of considerable data on the financial side of the operating conditions.

The paper and printing are very good, as are also the illustrations so far, at least, as the half-tones are concerned. There is room for improvement in the line-cut illustrations, particularly in the lettering, but this seems to be an inherent failing of mining magazines in general.

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A GEOLOGICAL MAP OF OHIO.—J. A. Bownocker, State Geologist, Columbus, O. Based on Preceding Maps by Newberry and Orton. 36 × 33 ins. 25 cts. (Send currency.)

This new map of Ohio, just issued by the State Geologist, is the first geological map of that state to be published since 1888. The new map is on a scale of 8 miles to an inch and shows railroad and traction lines, canals and rivers, oil and gas-producing areas, coal mines, Portland cement works, salt works, and gypsum mines. It should be a useful addition to the reference library of any engineer doing work in Ohio.

## A View of Modern Chemistry.

Reviewed by A. H. SABIN,* Assoc. M. Am. Soc. C. E.

THE FUNDAMENTAL PRINCIPLES OF CHEMISTRY.—An Introduction to All Text-Books of Chemistry. By Wilhelm Ostwald. Authorized Translation by Harry W. Morse. New York, London and Bombay: Longmans, Green & Co. Cloth; 5½ × 8¼ ins.; pp. 349; 65 illustrations in the text. $2.25, net.

In his visit to Columbia University a few years ago Professor Ostwald gave concurrent lectures on chemistry and metaphysics. This shows the most characteristic quality of his mind, which chooses to deal with concrete things, but seeks not merely observation but rational arrangement, the determination of causes and the establishment of laws. The book now before us is an attempt to set down in exact and formal, but as far as possible, non-technical, language those fundamental laws or principles which are manifested in chemical phenomena, as they are at present known; according to its subtitle it is An Introduction to all Text-Books of Chemistry; it is especially a guide to the teacher, but it is equally useful to all who wish to acquire a philosophical knowledge of the subject. It presupposes but a little knowledge; any one who has thoroughly studied an elementary text-book of chemistry, and has enough algebra to know that a fraction is a convenient way of saying that a quantity varies directly as the numerator and inversely as the denominator, and the like, can read it with entire comprehension; though, of course, sufficient familiarity with chemical facts to supply illustrations for the various laws makes the book easier reading. "Generalizations," says the author, "are the bony skeleton of the chemical body, and the teacher must always let the bones appear through the individual chemical facts if he wishes to make his teaching a true work of art."

The subjects are treated in a severely logical manner; definitions are given first, and the terms thus defined are always used with rigid adherence to these meanings. A good illustration of the author's definition, and one which will interest the engineer, is that of Entropy:

> Two forms of energy, volume energy and heat, are involved in the phenomena of evaporation, and they exhibit a great similarity. Volume energy can be considered as the product of two factors, the pressure and the increase of volume; and in the same way a change in heat energy can be considered as the product of two factors, of which one is the temperature. This corresponds to the pressure, for both values are intensities and not quantities. That this is true of temperature is evident from the fact that two bodies which have the same temperature do not show twice the temperature when they are brought together. The temperature remains unchanged. The other factor, which is a quantity in the narrower sense, and which is therefore additive, is not as well known as volume, which is the corresponding factor of volume energy.
>
> This comes from the fact that we have become accustomed in working with heat to use the energy itself; that is, the amount of heat, and with this, one of its factors, temperature. The other factor has so far been used only in mathematical physics, although it offers no greater difficulties to the understanding than a quantity of electricity or a momentum. In the case of volume energy the matter is reversed. Here the two factors, pressure and volume, are in common use, while volume energy itself is by no means so generally used.
>
> The capacity factor of heat energy is called entropy; the product of entropy and temperature gives heat energy. We must therefore be able to find entropy by dividing energy by temperature; 536 heat units are absorbed by a gramme of water changing to vapor under atmospheric pressure. The corresponding increase of entropy is to be found by dividing this number by the temperature 100° C. or 373 A., and the result is
>
> $$\frac{536}{373} = 1.44 \text{ entropy units.}$$

On the other hand, the style of reasoning, and method of expression, can be well shown by the following extract:

> A [chemical molecular] formula of this kind suggests an idea which needs careful consideration and one which is very often misunderstood. The symbols for the elements make up the symbols of compounds, and this suggests the thought that the elements are actually physically present in their compounds just as their symbols are present in the symbol of the compound. It is, however, characteristic of a chemical process that substances should disappear, and that others with other properties should take their place. The elements and their properties disappeared when the compound was formed, and it is therefore impossible that an element should persist in its compounds. The idea that the elements have disappeared, but are nevertheless present as such, is an indefinite one, too indefinite for scientific use. The elements can be recovered from their compounds whenever we choose, and this is, as a matter of fact, all we can say about them. It is somewhat analogous to what happens when an amount of money is taken to the bank for safe keeping. The same amount can be obtained from the bank in the same denominations at any time. It by no means follows that the bank has kept the coins paid in during the whole time, but only that the bank has means sufficient to return our deposit. What has become of the coins in the meantime we do not know, nor is it a matter of importance. A compound can at any time be transformed into its elements again, but we can only conclude from this that the condition for the formation of the elements always exists, and not that the elements persist as individuals in the compound. Certain properties of the elements, their weight, for example, are conserved in the compound, but a given weight cannot be changed by any process whatever, and this fact affords no proof for the persistence of the elements in a compound.

Roughly speaking, the first 60 pages of the book are given to definitions: bodies, substances, and properties; the three states of matter; mixtures, solutions, and pure substances. After this come the principles or laws: first, the change of state and equilibrium, as between gases, liquids, and solids, dealing largely with heat and pressure, melting and vaporizing, a chapter which any engineer may read with profit; then a fifth of the entire book is on solution, of gases, liquids, and solids, their formation and dissociation, critical and singular points, and eutectics; a most luminous and explicit treatment of the subject; of wide application, valuable to the metallurgist, to mechanical and chemical engineers, and to those interested in atmospheric evaporation and the like.

Nearly a fourth of the book is on Elements and Compounds, many sections of which are illustrated with simple diagrams, and deals with the nature and properties of elements, and the laws according to which they combine. The next chapter is on the law of combining weights; then one on what the author calls "colligative properties," being such as are related to molar quantities of substances, having no relation to their other properties. Reaction Velocity, and Equilibrium, and Isomerism follow, and the last chapter is on the Ions.

The book can hardly be called light reading, but it is clear and attractive in style, and is well adapted to clear the mind of many vague and indefinite notions. Chemical theory is by no means settled on many points; and its literature contains theories and hypotheses, devised in many cases to explain a very limited set of phenomena, and not bearing later and fuller investigation. The only secure basis for real knowledge is in the accurate and final determination of the relations between phenomena; not in a merely plausible hypothesis, which may only hide the truth.

The book deals with laws and principles; rarely, and only incidentally, is a chemical substance mentioned by name; and it does not contain a quotation.

The translation, by Dr. Morse, of Harvard, is extremely well done, and the book is well printed and made; some of the diagrams are not lettered, as decribed in the text, but are easily understood.

The book is to be commended to all who wish a fundamental knowledge of chemical principles, and will prove a permanent aid to the right interpretation of many chemical and physical phenomena. It is incomplete, as any such treatise must be; partly because many—perhaps most—laws are yet undetermined, and partly because the author restricts himself to the interpretation of relatively simple things.

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SANITARY CONDITION OF NEW YORK HARBOR.—Digest of Data Collected before the Year 1908. Prepared and Issued by the Metropolitan Sewerage Commission of New York (George A. Soper, President). Paper; 6 × 9 ins.; pp. 87.

The data here presented are founded on investigations made by the New York Bay Pollution Commission in 1904 and 1906, the Metropolitan Sewerage Commission in 1907, the Department of Water Supply, Gas and Electricity of the City of New York in 1904 and 1905, Mr. Charles F. Breitzke (on the Gowanus Canal) in 1906, the Burr-Hering Freeman Commission in 1908 (on the waters of the Lower Hudson), and finally investigations of the Passaic River made by Messrs. Hazen and Whipple in 1906. No attempt is made to draw conclusions from the data, the object being merely to make them available for study in connection with the later investigations made by the reorganized Metropolitan Sewerage Commission of New York.

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IRRIGATION ENGINEERING.—By Herbert M. Wilson, M. Am. Soc. C. E., Chief Engineer, U. S. Geological Survey, Author of "Topographic Surveying," etc. Sixth edition, revised and enlarged. New York: John Wiley & Sons. London, England: Chapman & Hall, Ltd. Cloth; 5¾ × 9¼ ins.; pp. 625; 38 plates, 195 text illustrations and 32 tables. $4; English price, 17s., net.

The fact that this is the sixth edition of a work first published in 1893 and that the total issue has gone to 7,000 is perhaps the best comment that could be made upon the usefulness of the book before us. Reviews of the first, second and fourth editions were published in Engineering News of March 30, 1893, and July 29, 1897, and in the Engineering Literature Supplement for Dec. 10, 1903. The last named notice was the most comprehensive of the three.

Under the circumstances it seems unnecessary to attempt any detailed review of the present edition. A general idea of the changes that have been made since the last edition may be gathered from the following paragraph from the preface to the sixth edition:

> The present edition has been almost entirely rewritten, bringing up to date the tremendous progress made in construction by the Reclamation Service. Since the last edition important changes have been produced in the design and in the materials used in structures on irrigation works as a result of the very general adoption of reinforced concrete for such works. Every chapter and every article of this edition has undergone changes, including the elimination of much old matter and 40 illustrations and the introduction of a large amount of new textual matter and 80 new illustrations, representative of more modern designs for irrigation works. I am indebted for information contained in this revision chiefly to the annual reports and published specifications of the Reclamation Service.

As a matter of convenience to those of our readers who may wish to gain a general idea of the contents of other recent books on irrigation as compared with the contents of this one as set forth in the reviews named above, we may state that in our issue of May 14, 1908, there were published notices of two British works on irrigation: "The Practical Design of Irrigation Works," by Mr. W. G. Bligh, M. Inst. C. E., and "Irrigation," by Sir Hanbury Brown, M. Inst. C. E., while in our issue of Aug. 13, 1908, appeared a notice of an American book entitled "Practical Irrigation," by Mr. Augustus J. Bowie, Jr. All three of the reviews just named were prepared by Mr. F. W. Hanna, of the U. S. Reclamation Service.

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THE ELEMENTS OF MECHANICS OF MATERIALS.—A Text for Students in Engineering Courses. By C. E. Houghton, Associate Professor of Mechanical Engineering, New York University. New York: D. Van Nostrand Co. Cloth; 5¼ × 8½ ins.; pp. 186; 88 illustrations in the text. $2, net.

This is exclusively a text-book for school use. The author designed it to be such, and he has succeeded in producing nothing else. How well he meets the special needs of instruction in this subject (if there be special needs) must be left to teachers to determine. That the book should be found useful to the engineer after his college years does not appear likely, and for self-study by those who have not enjoyed a college training its strictly scholastic style and arrangement unfits it.

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ADVERTISER'S HAND BOOK.—Written and compiled according to the latest advertising knowledge, by A. M. Stryker, especially for the use of Trade Journal Advertisers, being a Complete Guide, Ready Reference Book and Working Manual for all those who have occasion to prepare class advertising. Chicago, Ill.: Trade Journal Advertiser. Flexible cloth; 4 × 6 ins.; pp. 167; illustrated.

This little booklet should be a useful aid to the "publicity man" who is new to the work and desires to know how things are done. It contains much that will be of assistance also to

any one who has to do with advertising or printing and desires some information in this field. The matter on the production of cuts seems to be worthy of special commendation. Twenty-eight pages of the book are devoted to a list of trade journals and class publications. It is not stated from what source this list was compiled, but a casual inspection shows numerous errors and anomalies.

## A New Book on an Old But Little-Studied Subject.

CHOOSING A VOCATION.—By Frank Parsons, Ph. D., Late Director of the Vocation Bureau and Breadwinners' Institute, Civil Service House, Boston; author of "Youth and the World," etc. Boston and New York: Houghton, Mifflin & Co. Cloth; 5¼ x 8¼ ins.; pp. 165. $1, net.

The late Professor Parsons was engaged for a year or more prior to his death in the unique undertaking of trying to guide boys and girls and men and women into the occupation or position in life for which they were by temperament, training, general education and physical, mental and moral condition best fitted.

The book before us deals for the most part with the choice of a vocation from the viewpoint of those who are helping others to choose rather than those who are attempting to make the choice for themselves. The latter, however, will find much in the book to assist them, provided they have reached that stage of mental development which will enable them to grasp the essential features of the author's ideas and recommendations. Portions of the book are well within the comprehension and use of almost anyone who can read and who is old enough to choose a vocation.

The book is divided into sections dealing with personal and industrial investigations, respectively, and with the organization and work of vocation bureaus.

In making personal investigations, the excellent plan followed by Professor Parsons was to "put down on paper" a sufficiently wide and varied number of notes regarding the person seeking a vocation to give both the helper and the one being helped a close and clear analysis of the history, characteristics and probable capabilities of the latter. The searching questions formulated by Professor Parsons are well designed to give to most vocation seekers such a self-analysis as they have never thought of undertaking before.

One great aim of such a vocation bureau as Professor Parsons conducted was to reduce the enormous number of misfits in life, due to entering, generally by the merest chance, upon some occupation not at all suited to the person engaged in it. It is needless to tell any one acquainted with Professor Parsons or his work that so urgent a reformer as he came to the conclusion as a result of his studies and their practical application that there should be vocation bureaus connected with all the public schools of the country—at least those of the higher grades.

The book is well worthy the careful reading and thoughtful consideration of every man and woman who has to face the choice of workers in any field of life or upon whom devolves the duty and privilege of assisting anyone to choose a vocation.

LIGHTING ENGINEERS' HANDBOOK.—Compiled by L. R. Pomeroy. New York: The Safety Car Heating and Lighting Co. Flexible leather; 4 x 7 ins.; pp. 231; text illustrations. $1.

The author of this book is a well-known member of the American Society of Mechanical Engineers, who has had a long and varied experience in many different lines of engineering work. This book is a reprint of extracts from his private note-book, and covers a much broader field than might be supposed from the title printed on the cover. While Mr. Pomeroy is Assistant to the President of the Safety Car Heating and Lighting Co., and the book is issued by that company, only a small part of the book—less than one-fourth—is upon the subject of car lighting and heating. Some of the other general subjects treated are steam, traction, pipes and tubes,


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hydraulics, heat and heating, and electricity. While the book makes no pretensions to be a complete mechanical engineer's pocket-book, like the much larger and more expensive books such as Kent's, it contains a very great number of useful tables, and well deserves the neat morocco cover and gilt edges in which it is issued.

## An English Book on Hydro-Electric and Wind-Power Machinery.

Reviewed by F. C. FINKLE.*

NATURAL SOURCES OF POWER.—By Robert S. Ball, Assoc. M. Inst. C. E. New York: D. Van Nostrand Co. Cloth; 5½ × 8½ ins.; pp. 348; 104 illustrations, mostly in the text. $2, net.

This book, though brief in its treatment of the subject, possesses many features of value to the engineer. While it neither pretends to, nor does present anything new in regard to water and air power, it forms a compilation in condensed and convenient form, making it a valuable work of reference.

To American engineers, the book becomes interesting from the fact that it gives the views of an English engineer in reference to hydro-electrics, that branch of civil engineering in which the greatest advance has occurred recently. Since most of the progress in this branch of engineering has occured in America, it is to be expected that the presentation of many details will be imperfect and even incorrect, when coming from an author on the other side.

This applies to Mr. Ball's work, although most of his statements and conclusions are remarkably accurate and good, considering the great distance from which he has viewed the latest progress and achievement in hydro-electric engineering. The first three chapters are good examples of a correct and precise presentation of the subjects they cover. The reviewer does not recall any book with a better introduction, or with better rules for ascertaining and applying water power to the propulsion of machinery. The only just criticism on this part of the book is the large amount of space devoted to "leveling" in the second chapter, as this subject is one belonging to a work on surveying rather than on hydraulics.

While many complimentary things can be said for the remaining chapters on water power, namely, Chapters IV. to VIII. inclusive, it is more important to bring out defects when reviewing a work than to repeat and approve those things which carry their own commendation. With this object solely, the following brief observations are made to forestall some erroneous impressions which the student may receive from Mr. Ball's otherwise valuable work:

In Chapter IV., it should appear that lower efficiencies are to be expected from outward radial flow turbines than from those of the inward flow Francis type. The difficulty of securing good regulation with the Fourneyron type of turbine is well stated by Mr. Ball, but he fails to call attention to its lower efficiency under general conditions, when compared to the Francis. In fact, he states that the Jonval turbine is less efficient than the Girard, thereby creating the impression that parallel and inward flow turbines are less desirable from the standpoint of efficiency than those of outward flow.

Such an idea is entirely out of accord with both theory and practice. The Jonval, a parallel flow turbine, is more efficient for low and variable heads than the Girard, and for the higher heads, to which reaction turbines are adapted, is at least equally as efficient. But for these higher heads the Francis is more highly efficient than either. This has been shown in practice, and can be demonstrated theoretically, as the water must needs leave an inward discharge turbine with less absolute velocity than it can one of outward flow.

It is true that in Europe the Girard has been modified to work under high heads, which are not suited for the Francis, or any reaction turbine for that matter. But American practice has demonstrated the superiority of impulse tangential wheels for these high heads, thus eliminating the Girard altogether. Mr. Ball shows his lack of familiarity with this on pp. 71 and 108, where he states that the Pelton type or tangential jet wheel is not as efficient under exceptionally high as under medium falls. This idea has gained ground from the low efficiencies at the Pikes Peak Hydro-Electric Co.'s plant at Manitou, Colo., which condition is due to causes other than the type of water wheels, as is demonstrated by the high efficiencies secured at the Southern California Edison Co.'s Mill Creek No. 3 plant under 1,927-ft. head. The same erroneous statements are again repeated on p. 147, and the reasons ascribed for the low efficiency at Manitou are entirely wrong, of which fact Mr. Ball appears to be unaware, although the facts are well known to all engineers in America, who have investigated both this plant and Mill Creek No. 3 plant at Redlands, Cal.

On p. 128 the method proposed for mixing concrete in proper proportion is not the best. A mixture based on the percentage of voids in the sand and gravel is more scientific and safer.

The specifications proposed on pp. 140–142 are very deficient in many ways, some of which are as follows: No provision for moment of inertia in the revolving elements is made, no tests for over-speed, static or dynamic balance, or of the wheel casing are prescribed. The efficiency required at different gate openings is not given, nor is there any list of the parts required for the turbine.

Likewise the statement on p. 165 that line insulation for more than 60,000 volts cannot be satisfactorily secured is erroneous. For the last two years, since the suspended insulator was perfected, many lines with 100,000 to 120,000 volts have been constructed and are operated with entire success, while before that, the Edison Kern River plant in California carried 75,000 volts on a line with upright insualtors.

Chapter VIII. on regulation is very good, but some crystallized form should have been given to the formulas and principles affecting regulation as therein discused, so as to have made them more easy of application in practice.

There can be no criticisms made on the last four chapters relating to air power and windmills. The result of what Mr. Ball has written will be to aid engineers having to deal with this problem by making available in condensed form information to be secured only from an examination of much and varied literature on windmills.

*Consulting Engineer, 230-231 I. W. Hellman Bldg., Los Angeles, Cal.

BIBLIOGRAPHY OF THE COTTON MANUFACTURE.—By C. J. H. Woodbury, A. M., Sc. D., Consulting Engineer, Secretary of The National Association of Cotton Manufacturers. Boston, Mass.: The Association. Cloth; 6¾ × 10 ins.; pp. 213. $2.

The author of this excellent compilation, Mr. C. J. H. Woodbury, M. Am. Soc. M. E., is well known among engineers, and his valuable services as Secretary of the National Association of Cotton Manufacturers have made him well known also in the textile world. The bibliography is divided into six sections, as follows: (1) Cotton manufacture; (2) Finishing; (3) Engineering and machinery; (4) History and economics; (5) Cotton; (6) Journals. The entries are alphabetized in each section, and as the entries are usually under the name of the author it is rather difficult to use the bibliography to find what has been published on a given subject. The number of entries is not so large, however, but that one can with a little patience discover what works are in existence in a field which he desires to investigate. It is to be regretted that work of this sort in the collection and compilation of published data is done so infrequently.

COALING, DOCKING, AND REPAIRING FACILITIES OF THE PORTS OF THE WORLD.—Fifth edition. Office of Naval Intelligence (C. E. Vreeland, Captain, U. S. N., Chief Intelligence Officer). Washington, D. C.: Pub. Doc. Paper; 5¾ × 9¼ ins.; pp. 239.

This very useful compilation gives in Part I. a complete record of the different kinds of fuel, both coal and oil, to be had in every seaport of the world, the complete table occupying 80 pages of the pamphlet. In Part II. are given the docking and repairing facilities, including docks with their dimensions of length, width and depth, rise of tide, shipyards, machine shops, etc., able to repair steamers, and a statement of the size of shafts, diameter of pipes and weight of castings that may be made. This list occupies the remaining 120 pages of the pamphlet. This report is the fifth edition of a work first published by the Navy in 1885, the last edition of which was issued in 1900. It should be of much service to vessel owners, and its list of dry-dock dimensions in various ports of the world may be useful to some engineers.

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## Biographies of British Engineers.

BRITISH ENGINEERS AND ALLIED PROFESSIONS IN THE TWENTIETH CENTURY.—Contemporary Biographies. Edited by W. T. Pike. (Pike's New Century Series, No. 24.) Brighton, England: W. T. Pike & Co. Cloth; 9½ × 12¼ ins.; pp. 436; plates, and numerous text illustrations. £5 5s. in England, by subscription only.

The principal value of this volume lies in the biographies of British engineers which occupy three-fourths of its pages. The first one hundred pages, however, are devoted to a series of articles purporting to trace the development, in the British empire, of civil, mechanical, mining, gas, marine and railway engineering. In this connection there are given also historical notes on the leading British engineering institutions, or societies, in each field.

The articles on engineering progress are contributed, for the most part, by engineers of personal experience in the various branches covered. The final article is a reprint of a paper on "Standardization in British Engineering Practice," read before the British Association in 1906 by Sir John Wolfe Barry, chairman of the engineering standards committee of the engineering institutions. An attractive feature of this introductory portion of the book is found by the numerous and clear illustrations showing works accomplished under the direction of British engineers. In nearly every case, the names of the engineers who had charge is given in the explanatory note accompanying each illustration.

The biographical notes are accompanied, with few exceptions, by portraits of their subjects, and give a bare record of positions, titles and principal achievements. They are divided into three groups, each with its own separate alphabetical arrangement. The first two groups include, respectively, sirs and misters, and a third division is made to include biographies of about a dozen deceased engineers, all those included in this division having died since 1900. The biographies in the two main divisions are of engineers now living. An alphabetical index to the biographies obviates the difficulty which might otherwise arise from their separation into groups and shows a total of about 700 names

BUILDING PLANS AND HOW TO DRAW THEM.—A Simple Series of Practical Lessons on Architectural Drawing, Showing Every Step Necessary to Draw the Full Working Plans of Buildings. Intended for the Self-Instruction of Building Mechanics. By I. P. Hicks, Author of "Architectural Perspective for Beginners," etc. Third edition. New York: Industrial Publication Co. Cloth; 8½ × 7½ ins.; pp. 78; numerous illustrations in the text. 50 cts.

A SIMPLE TREATISE ON ARCHITECTURAL PERSPECTIVE FOR BEGINNERS.—Containing Practical Directions for Drawing Perspective Views from the Floor Plans and Elevations of Houses. By I. P. Hicks, Author of "Building Plans and How to Draw Them," etc. New York: Industrial Publication Co. Cloth; 8½ × 7½ ins.; pp. 36; text illustrations. 50 cts.

A DICTIONARY OF TERMS USED IN ARCHITECTURE AND BUILDING.—Compiled from the Best Authorities. New York. Industrial Publication Co. Cloth; 4¾ × 7½ ins.; pp. 104; numerous illustrations in the text. 50 cts.

These three books are intended by the publisher for home study. The first is designed to enable a carpenter, contractor or builder to prepare plans for simple buildings without resorting to an architect or a regular draftsman. The book is a reprint of a series of articles published in "Carpentry and Building' a dozen years ago, and the first edition was published in 1897.

The treatise on perspective contains in its 36 pages hardly enough matter to deserve the name of treatise. It is intended, like the other book, for the use of mechanics; but it is doubtful whether any considerable proportion of the mechanics who can master the drawing of plans and elevations can succeed in making architectural perspectives. In most cases it will be far cheaper for them to hire an architectural draftsman to make a perspective drawing, if they desire one for a client, than to attempt it themselves.

The "Dictionary" is a curious compilation, made up largely of terms relating to ancient or ecclesiastical architecture or to fortification. Here are a few examples from a single page: Agger, Agora, Albarum opus, Alipterion, Almehrabh, Ambitus, Ambo, Ambry. The preface alleges that "the young student of architecture and


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building construction has need of a small dictionary of the various terms used in its literature." We fear he will find very little in this compilation that will be of any earthly use to him.

## Factory Organization and Cost.

Reviewed by HARVEY S. CHASE* and CLINTON H. SCOVELL.*

NICHOLSON ON FACTORY ORGANIZATION AND COSTS.—By J. Lee Nicholson, Certified Public Accountant and Factory Cost Specialist. New York: Kohl Technical Publishing Co. Cloth; 8 x 11½ ins.; pp. 410; numerous illustrations in the text. $12.50.

Mr. Nicholson's book is divided into four fairly distinct parts. At the beginning are four chapters dealing with "Organization and Cost Finding," "Wage Systems," "Analysis of Cost Accounting," and "Distribution of Indirect Expenses." The three remaining sections of the book are devoted respectively to a presentation of forms according to a classification of kind or use, a few complete "cost systems," and finally a section descriptive of time clocks, adding, duplicating and addressing machines, and filing devices.

The book is a volume of 425 pages, 9 x 12, substantially bound, and printed on heavy glazed paper. Irrespective of the price, which is large enough in itself to attract attention, the appearance of the book awakens wonderment as to what the author could put within these covers that would seem worthy of such an elaborate, not to say formidable, presentation; indeed, after careful study of the book we find ourselves left with the same impression.

The first chapter is devoted to an exposition of the generally accepted view that good cost accounting is necessary for an enterprising manufacturer. Chapter II. gives a description of different systems of paying wages and is made to include the subject of bonuses, profit sharing, and stock distributions, which can hardly be considered wage systems in any proper sense of the word. Chapters III. and IV. set forth summaries of the main ideas in current articles dealing with Cost Accounting and Indirect Expense and, though relieved here and there by a good paragraph, do not compare favorably with the best that is available elsewhere to students of these subjects.

The compilation of forms which makes up the second section of the book is creditable to the author's industry and reflects the variety of his experience. Some of the designs are based on excellent ideas, but the best practice is not always illustrated in these pages. The triplicate purchase order, for example, which provides the storeroom with a complete record of the order without any indication of quantities, is not presented in the chapter dealing with this subject, and the bookkeeping forms do not always exhibit the most modern practices with which accountants are familiar.

The third section of the book outlines several "complete cost systems." These chapters show the author at his best and will be found interesting reading by manufacturers who are trying to find their way alone in the maze of highways and byways in industrial accounting.

The last sixty pages of the volume are devoted to a description of various mechanical appliances for use in offices and factories. The illustrations, for the most part, seem to have been taken direct from the manufacturers' catalogs, and when one considers that practically all of this information is available to anybody who follows the advertising pages of the business magazines, it is difficult to understand why it should have been included at all in a work of this kind, except that the author intended the volume to be a general compendium of information on the subjects treated.

Mr. Nicholson evidently undertook to prepare a volume which should be useful as a book of reference for accountants and cost specialists, as a text-book for the student, and as a hand-book for manufacturers who are interested in modern methods. To this end he has presented a great variety of forms and ideas which should make the book valuable in the first class mentioned. We think it is too much to expect that the work will ever find any great field in any other respect. The author's style is not adapted to students who are unfamiliar with the subject, and his explanations frequently seem obscure and sometimes incomplete to the professional accountant. The style of the book is not distinctive, in fact, is rather commonplace throughout. The information which it seeks to convey can undoubtedly be purchased and assimilated to much better advantage if acquired in smaller packages.

*Of the firm of Harvey S. Chase & Co., Public Accountants and Auditors, 84 State St., Boston, Mass.

CONCRETE IN RAILROAD CONSTRUCTION.—A Treatise on Concrete for Railroad Engineers and Contractors. New York: The Atlas Portland Cement Co. Stiff paper; 6½ x 8¾ ins.; pp. 228; numerous text illustrations. $1.

CONCRETE IN HIGHWAY CONSTRUCTION.—A Text-Book for Highway Engineers and Supervisors. New York: The Atlas Portland Cement Co. Paper; 6½ x 8¾ ins.; pp. 136; numerous text illustrations. $1.

CONCRETE CONSTRUCTION ABOUT THE HOME AND ON THE FARM.—The Recognized Text-Book of Cement Users. Revised edition, 1909. New York: The Atlas Portland Cement Co. Paper; 6½ x 9 ins.; pp. 160; numerous text illustrations.

Although issued for purposes of publicity, a careful reading of these three pamphlets fails to reveal any very pronounced advertising of the particular cement which this company manufactures or even any bigoted defense of concrete as a material superior to its competitors. Instead, each of the volumes is a clearly written and remarkably well-illustrated description of the design and construction of the various structures which come in the fields covered by the three titles. Naturally, these descriptions tend to enhance the reader's opinion of concrete, but, as a rule, this impression is legitimately brought about by reference to really good work which has been done. For examples of concrete construction on railways, highways and on the farm, we know of no better collection of matter.

The first one noted above takes up in order bridges, culverts, retaining walls, stations, trainsheds, coal and ash plants, tunnels, ties, poles and other minor railway structures. The second is for the benefit of the highway engineers, and after a short general discussion of the making of concrete, discusses sewers, drains, culverts, beam and arch bridges, retaining walls and decorative highway features. The last of the three is a second edition of one of the company's publication reviewed before in these columns. It contains a number of valuable hints on numberless small applications of concrete around the home and farm. As engineering literature it has not much value, but for the farmer or householder it offers considerable that may prove useful.

None of the books are very technical; reasons for and details of design are not touched upon, but the pages do contain a quantity of carefully selected examples of good concrete structures.

METAL CORROSION AND PROTECTION.—References to Books and Magazine Articles. Reprinted from the Monthly Bulletin (Carnegie Library of Pittsburg), July, 1909. Second edition, revised and enlarged. Pittsburg, Pa.: The Library. Paper; 6 x 9 ins.; pp. 64.

This list deserves wider publicity than the ordinary city library publication usually gets. It is a very complete bibliography of the American and foreign articles and books on the very timely subject of metal corrosion and protection. Each heading is accompanied by a brief synopsis of the nature of the article listed.

OAK FLOORING.—Being an Outline of Correct Methods of Manufacturing, Handling, Laying and Finishing, with an Analysis of Widths, Thicknesses and Grades. By Henry H. Gibson, Editor "Hardwood Record." Chicago, Ill.: Hardwood Record. Boards; 6 x 9 ins.; pp. 38; illustrated. 50 cts.

This thin little booklet is gotten up more in the style of a trade publication than a technical treatise. It contains a little information of a general character concerning the methods of manufacturing, laying and finishing oak flooring.

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## Efficiency Engineering.

EFFICIENCY AS A BASIS FOR OPERATION AND WAGES.—By Harrington Emerson. New York: The Engineering Magazine. Cloth; 5 × 7½ ins.; pp. 171; text illustrations. $2.

The author of this little book is a well-known consulting engineer who has specialized in what he terms "efficiency engineering." The book, however, is not a technical treatise on shop management or on methods of paying labor or on industrial organization or cost-keeping. It is a series of essays relating to all these and similar subjects, but written in a style peculiarly the author's own, and so involved and profuse in its use of illustrations and figure of speech that one is reminded of another writer of the same surname and far wider fame.

Some idea of the range of the book can be obtained by running over the titles of some of the chapters: "National Efficiencies; Their Tendencies and Influence"—"Line and Staff Organization in Industrial Concerns"—"The Location and Elimination of Wastes"—"The Realization of Standards in Practice"—"Standard Times and Bonus."

To give an idea of the style of the book, we select, almost at random, the following quotations:

In tabulating inefficiencies it is not assumed that it is a human ideal to work hard all the time and spend nothing.

The unit is the man. If he elects and can manage it, he can live in a tub, bask in the sun, and curtail his efforts and wants to a minimum. If he elects, he can work hard for days, weeks, or months, and in short and riotous extravagance spend all he has accumulated. The fire-fly probably is chargeable with both extremes, but what is expected is that the man shall emulate the fire-fly in working efficiently when he does work, whether the total time given to work be long or short.

* * * * * *

To preserve the adult individual, Nature uses staff organization; to preserve the race, Nature uses line organization. Both are necessary, and they may operate separately, they may alternate, they may work in parallel; but always and everywhere it is one or the other or a blending of both. Man, the individual, is fitted out with a number of aids, each far superior to him, each knowing what to do and how to do it, knowing how to respond to his every call to the extent of its ability. His lungs, his heart, his stomach, his nervous system, how instantaneously they come to his rescue in an emergency! On the other hand, a father is succeeded in time by his son, one generation gives way to another; "the king is dead, long live the king!" This is line organization.

* * * * * *

A proposition was made to the line officers of a large corporation to reduce expenses $2,000,000 per annum. Whatever the time required to accomplish this, every day's delay caused an irretrievable loss of $6,606; yet details that ought to have been decided in eight minutes were allowed to wait for eight months. Line traditions vitiated staff ideals, and as the line lasts forever it is not imbued with speed ideals.

* * * * * *

To enter a shop employing 2,000 men, each one doing an average of four different jobs each day, aggregating for all the men 8,000 separate tasks, these tasks changing from day to day, so that there is a total of tens of thousands of different tasks in a year—to be expected to standardize each and every one of the tasks as to both time and cost, is dismaying; not more dismaying perhaps than the proposition would have been to the primitive woman, whose hair was a mass of matted tangles, that each and every one of the separate hairs of her head ought to be brushed and combed into its perfect place at least twice every day.

* * * * * *

There was a railroad shop in which charges were distributed with such painful care that the shop sweepers subdivided their time to the various locomotives around which they loitered. But locomotives, as well as men, can loiter, and one of the locomotives stood in this shop three months waiting for a steel deck plate. Being familiar with its number, the workers charged all the time they could not readily account for to this locomotive, so that at the end of three months the total amounted to more than $5,000. The fictitious accuracy as to the sweepers' time made more glaring the gross falsity of the locomotive charge.

* * * * * *

If we could eliminate all the wastes due to laziness and misdirected efforts, all men would be reasonably and healthfully industrious. It is not impossible that through efficiency standards, with efficiency rewards and penalties, we could in the course of a few generations crowd off the sphere the inefficient and develop the efficient, thus producing a nation of men good, wise, and industrious, thus giving to God what is His, to Caesar what is his, and to the individual what is his.

There is a great deal of thought-provoking material in the book, as may, indeed, be gathered from the above quotations; but there are frequent statements, particularly in the "side remarks," which tempt the reader to disagreement and which really have so little to do with the author's main thought that they had better have been omitted.

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THE METAL SCHEDULE OF THE TARIFF OF 1909.—Philadelphia, Pa.: American Iron and Steel Association. Flexible cloth; 3½ × 6 ins.; pp. 32.

This little pamphlet gives the complete text of the metal schedule of the present United States tariff law, and also with each section the corresponding text in the Dingley tariff.


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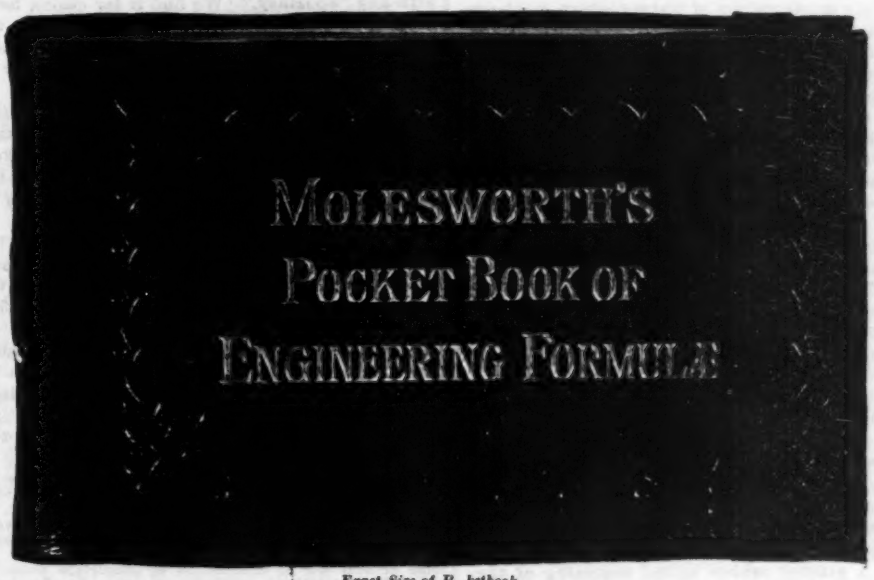


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The increasing interest in the matter of clean streets and the absence of any treatise which may serve as a guide to right principles and practices in this branch of sanitation has led to the publication of this book, which consists of notes based upon Dr. Soper's extensive personal experience in work of this kind under peculiarly difficult circumstances, and also upon studies made by him during a visit to Europe in 1907, in an advisory capacity to a commission on street cleaning for New York appointed by Mayor McClellan.

The book is profusely illustrated with views taken by the author of street conditions in different cities, and describing various devices and systems in use for the cleaning of streets and the removal and disposal of refuse. This feature of the book cannot be too highly commended.

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**THE ENGINEERING NEWS BOOK DEPT.,** 220 Broadway, New York

## American Railway History and Romance.

WHEN RAILROADS WERE NEW.—By Charles Frederick Carter. With Introductory Note by Logan G. McPherson. New York: Henry Holt & Co. London, England: George Bell & Sons. Cloth; 5⅝ x 8⅝ ins.; pp. 324; 16 plates. $2, net.

This book deals with the early days of American railways, and presents in a "popular" readable style much matter of history which has been published before in various ways. Much of the intimate and popular information (and the conversations), however, must be taken on trust or with some shadow of doubt; as, for instance, where the "girlish enthusiasm" of a bride on her honeymoon trip by rail (in 1831) is said to have led to the building of the Erie Ry., or where the fancy of an engine painter is said to have given the name "Stourbridge Lion" to the English locomotive which was the first to be operated in this country. At that time it was usual to name the engines (a practice still followed to some extent in England), and it is not likely that the painter of the engine was responsible for its name.

The difficulty of ensuring historical accuracy is well shown by the author in several instances cited in his preface. Even Horatio Allen is said to have been mistaken in giving the date on which he made the first trip with the first locomotive on an American railway, and an historical paper written by an officer of the Lake Shore & Michigan Southern Ry. "errs regarding the day, month and year" of the Ashtabula wreck. Nevertheless, the book itself is very definite in its statements of dates and details.

After a general review of the beginning of the railway era, about 155 pages are devoted to the first great railways of the eastern states: The Baltimore & Ohio, the Erie, the Pennsylvania, and the Vanderbilt system. A single chapter records various events in the development of railways in the middle west; and another is devoted to the Atchison, Topeka & Santa Fe Ry., with the lawless conditions of the early western towns and the historic fight (legal, engineering and physical) between this road and the Denver & Rio Grande Ry. for possession of Raton Pass and the Grand Canyon of the Arkansas. A special chapter is devoted to the transcontinental projects and to the construction of the Union Pacific Ry. and the Central Pacific Ry., which together completed the first transcontinental line.

The closing chapter deals with the inception and construction of the Canadian Pacific Ry. We hope that in a few years there will be put on record similar historical and romantic information respecting the second (and perhaps the third) Canadian transcontinental line.

In these days of comfort, convenience and luxury, it is worth while to read of the early stages of the development of our great railway systems. But it is worth while only if we read understandingly (not as we read the romance of fiction), and try to realize the conditions under which these developments have taken place; conditions of finance and politics, of commerce and enterprise, of prejudice and foresight, of engineering skill (both civil and mechanical), and also of romance in the promotion and execution of railway projects. There are other books which cover the field of the one under review, but there is an opportunity for a book of the same character covering a later period of the railway era, say 1870-1905. It is true that Spearman's "The Strategy of Great Railways" does this to a limited extent, but the period includes many notable developments and events which might well be put on record in an interesting manner before they become matters of ancient history.

## Isostasy.

THE FIGURE OF THE EARTH AND ISOSTASY FROM MEASUREMENTS IN THE UNITED STATES.—By John F. Hayford, Inspector of Geodetic Work, and Chief, Computing Division Coast and Geodetic Survey [Department of Commerce and Labor Coast and Geodetic Survey]. Washington, D. C.: Pub. Doc. Cloth; 9 x 11¼ ins.; pp. 178; 11 text illustrations and 6 folding plates in pocket.

"Isostasy" is not a word familiar to the average man or even to the average educated engineer. If one found the word in some other connection he might be tempted to guess the meaning as a new esoteric cult. Some of our readers may remember a new religious sect which originated in Chicago some years ago and which had as its chief dogma that the earth was flat instead of round. It is needless to say that the Coast Survey in general and Prof. Hayford in particular does not adhere to the "flat earth" theory. "Isostasy" has nothing to do with any "apostasy." We find it far easier, however, to tell the reader what "Isostasy" is not than to tell what it is. In fact for a complete explanation we shall have to refer the reader to the book itself.

We may say, however, that "Isostasy" refers to Isotatic conditions in the earth's crust, that is, to the relative density of the crust in different parts, and the effect of this density upon the stresses in the crust due to some parts being at higher elevations than others.

The investigation of the shape and size of the earth and of the condition of its crust has been in progress in the computing division of the Coast & Geodetic Survey for more than five years, and Mr. Hayford himself has been at work upon the problem for more than ten years. The general method pursued—so far as it can be explained in a word—is to observe the deflections of the vertical at various stations caused by the variation in topography or variations in the density of the earth's crust.

The summary of conclusions near the close of the book may be quoted as follows:

From general studies of observed deflections of the vertical in the United States, corroborated by similar observations in other countries, it appears that there must be some general law of distribution of subsurface densities which fixes a relation between subsurface densities and surface elevations such as to bring about an incomplete balancing of deflections produced by the topography, on the one hand, against deflections produced by variations in subsurface densities, on the other hand. The theory of isostasy postulates such a relation between subsurface densities and surface elevations. Therefore it is important to investigate the condition called isostasy in connection with any extensive investigation based on observed deflections of the vertical. In the condition called isostasy the excess of matter above sea level at each part of the earth's land surface is compensated by a defect of density below that part, and the surface deficit of matter at each part of the earth's surface which lies below sea level is compensated by an excess of density below that part. * * *

* * * * * * * *

For the United States and adjacent areas, if the isostatic compensation is uniformly distributed with respect to depth, the most probable value of the limiting depth is 70 miles (113 kilos.), and it is practically certain that the limiting depth is not less than 50 miles (80 kilos.) nor more than 100 miles (150 kilos.). * * *

* * * * * * * *

For the United States and adjacent areas the assumption of extreme rigidity is far from the truth. The United States is not maintained in its position above sea level by the rigidity of the earth but is, in the main, buoyed up, floated, because it is composed of material of deficient density. The writer estimates that the stress-differences in the material and in and about the United States have been so reduced by isostatic compensation that they are less than one-twentieth as great as they would be if the continent were maintained in its elevated position and the ocean floor maintained in its depressed position by the rigidity of the earth.

It is on the whole comforting to know that the continent on which we trifling morsels of humanity live is floating in stable equilibrium on the molten lava below us, and that we are not dependent on the stiffness of the rock crust to keep our continent from sinking beneath the oceans.

## A Study of Labor and Capital in Fall River, Mass.

THE CITY OF THE DINNER-PAIL.—By Jonathan Thayer Lincoln. Boston and New York: Houghton Mifflin Co. Cloth; 5 x 8 ins.; pp. 186. $1.25, net.

This is not an ordinary technical book—as might, indeed, be guessed from its title. In fact, it is hardly to be classed as a technical book at all, but rather as a study, or better still a series of essays, in sociology. But what is all too rare, either in sociological essays or in technical treatises, is the quality which we find in this book, namely, literary excellence. The reader who picks up this book and begins the first chapter will find himself so interested that he will be apt to finish the chapter, at least, before he lays the book down. The book is a reprint of a series of papers first published in the "Atlantic Monthly" and the "Outlook," which accounts, in part at least, for its literary quality. We can heartily commend it to any thinking man who is giving attention to the complicated problems involved in the strife between labor and capital.

The main thought of the book is a simple one. The author's whole aim is to emphasize the human element in the labor problem, and the need of recognition of that human element in groping for the best solution. The Chapter on "The Time-Clock" well illustrates the author's standpoint. He remarks that "much of our industrial discontent arises from the time-clock, or rather from the thought for which the time-clock stands." The author then explains that the worker is registered by a number on the time-clock, and remarks that

while it is quite right to fine a man for being a minute late in getting to his work—if it has become a fixed habit—it is equally wrong to rob him of his name if the crime may be avoided.

The author frankly admits that the time-clock has become a necessity in thousands of factories where great numbers of workingmen are employed, but he cautions lest the idea for which the time-clock stands be so carried out as to rob the worker of his individuality and indi-


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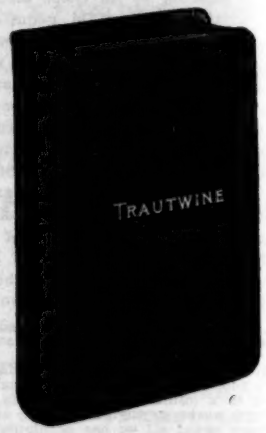


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vidual zeal. He quotes a manufacturer as remarking: "A man may press his button on the time-clock promptly at seven every morning in the year, yet the same man may cheat me out of 300 hours every 12 months."

The chapter on "Trade-Unionism and the Individual Worker" is notable for the writer's calm discussion of a subject over which such fierce conflict now rages. Taken as a whole, the book is one which every true lover of democracy and of the perpetuation of our social institutions will find benefit in reading.

CARBURETTORS, VAPORISERS AND DISTRIBUTING VALVES.—Used in Internal Combustion Engines. By Edward Butler, M. Inst. M. E. London, England: Charles Griffin & Co., Ltd. Philadelphia, Pa.: J. B. Lippincott Co. Cloth; 5½ × 8¾ ins.; pp. 176; 112 illustrations in the text. $2, net.

The object of this treatise is to present information specially useful to engineers, designers and others engaged in constructing internal combustion engines for automobiles, stationary and marine engines. The book is confined to the discussion of carburettors for use with gasoline and similar volatile fuels, vaporisers for use with kerosene and crude oils, admission and exhaust valves, and two-cycle and valveless engines. As would naturally be expected, the book refers most largely to English practice, although the practice of continental manufacturers is quite well represented and some of the more prominent American designs are shown. The author states that the illustrations have, wherever practicable, been prepared from actual working drawings. The larger proportion of them, however, appear to have been taken from some trade publication, or have been made with the crudeness with which many such illustrations are made abroad. As a result, many of the drawings are quite difficult to follow.

The book should be useful for any engineer engaged in any way in the design of internal combustion engines. It covers a limited but nevertheless very important field.

## Publications Received.

ALLGEMEINE THEORIE UEBER DIE VERAENDERLICHE BEWEGUNG DES WASSERS IN LEITUNGEN.—Part I. By Lorenzo Allièvi. Expanded German edition, prepared by Robert Dubs and V. Bataillard. Part II.: Stollen und Wasserschloss. By Robert Dubs. Berlin, Germany: Julius Springer. Paper; 6½ × 9¾ ins.; pp. 296; 35 illustrations in the text. 10 marks; American price, $4.

ALTERNATING CURRENT MOTORS.—By A. S. McAllister, Ph. D. Third edition, revised and enlarged. New York: McGraw-Hill Book Co. Cloth; 6 × 9½ ins.; pp. 322; 138 illustrations in the text. $3, net.

AMERICAN CERAMIC SOCIETY.—Transactions, Vol. XI. Containing Papers and Discussions Read at the Meeting Held at Rochester, N. Y., Feb. 1-3, 1909, with Some Other Contributions. Columbus, O.: The Society (Edward Orton, Jr., Secy.). Stiff paper; 6 × 9 ins.; pp. 632; illustrated.

AMERICAN WATER WORKS ASSOCIATION.—Proceedings of the Annual Convention Held at Washington, D. C., May 11-16, 1908. (J. M. Diven, Secretary, 14 George St., Charleston, S. C.) Cloth; 5⅞ × 9¼ ins.; pp. 804; folding and other plates, and text illustrations.

APPLIED STATICS.—By T. R. Loudon. Toronto, Ont.: The Canadian Engineer. Cloth; 6 × 9¼ ins.; pp. 96; 57 illustrations in the text. $1, net.

THE ARCHITECTS' DIRECTORY AND SPECIFICATION INDEX FOR 1909.—Containing a Complete List of the Architects of the United States, Canada, Cuba and Porto Rico, Classified by States and Towns, Landscape and Naval Architects of the United States and Canada, Architectural Societies and Organizations of the World, Architects of the Boards of Education in the Principal Cities of the United States and Canada, etc. Published annually—ninth edition. New York: William T. Comstock. Cloth; 6¾ × 10 ins.; pp. 212. $3, net.

BOARD OF HEALTH (New Jersey).—Annual Report, 1908, and Report of the Bureau of Vital Statistics. (Bruce S. Keator, M. D., Secy., Asbury Park.) Trenton, N. J.: Pub. Doc. Cloth; 5¾ × 9 ins.; pp. 650; diagrams and tables.

A BRIEF HISTORY OF CEMENTS.—Including the World-Famed Portland Cement. (By I. C. Johnson, Gravesend, England.) Kansas City, Mo.: The Cement Record Co. Stiff paper; 6 × 9¼ ins.; pp. 27; illustrated. 50 cts.

BULLETIN OF REVENUES AND EXPENSES OF STEAM ROADS IN THE UNITED STATES.—For the Nine Months Ending March 31, 1909. No. 1. Prepared by the Bureau of Statistics and Accounts (Interstate Commerce Commission). (Henry C. Adams, in charge of Statistics and Accounts.) Washington, D. C.: Pub. Doc. Paper; 9¼ × 11½ ins.; pp. 67.

BULLETINS, U. S. GEOLOGICAL SURVEY.—George Otis Smith, Director. Washington, D. C.: Pub. Doc. Paper; 5⅞ × 9¼ ins.

No. 388: The Colloid Matter of Clay and Its Measurement. By Harrison Everett Ashley. Pp. 65; one plate and nine text figures.

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PART II.—FRAMED STRUCTURES—ROOF TRUSSES

CHAPTER VII.—DEFINITIONS.
CHAPTER VIII.—LOADS.
Art. 1. Dead Load.
Art. 2. Snow Load.
Art. 3. Wind Load.
CHAPTER IX.—REACTIONS.
Art. 1. Reactions for Dead and Snow Loads.
Art. 2. Reactions for Wind Loads.
CHAPTER X.—STRESSES IN ROOF TRUSSES.
Art. 1. Definitions and General Methods for Determining Stresses.
Art. 2. Stresses by Algebraic Moments.
Art. 3. Stresses by Graphic Moments.
Art. 4. Stresses by Algebraic Resolution.
Art. 5. Stresses by Graphic Resolution.
CHAPTER XI.—WIND LOAD STRESSES.
Art. 1. Both Ends Fixed—Reactions Parallel.
Art. 2. Both Ends Fixed—Horizontal Components of Reactions Equal.
Art. 3. Leaward End of Truss on Rollers.
Art. 4. Windward End of Truss on Rollers.
CHAPTER XII.—STRESSES IN CANTILEVER AND UNSYMMETRICAL TRUSSES—MAXIMUM STRESSES.
Art. 1. Stresses in Cantilever and Unsymmetrical Trusses.
Art. 2. Maximum Stresses.
CHAPTER XIII.—COUNTERBRACING.
Art. 1. Definitions and Notation.
Art. 2. Stresses in Trusses with Counterbracing—Separate Stress Diagrams.
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CHAPTER XIV.—THREE-HINGED ARCH.
CHAPTER XV.—STRESSES IN A TRANSVERSE BENT OF A BUILDING.
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PART III.—BEAMS

CHAPTER XVII.—BENDING MOMENTS, SHEARS AND DEFLECTIONS IN BEAMS FOR FIXED LOADS.
Art. 1. Bending Moments and Shears in Cantilever, Simple, and Overhanging Beams.
Art. 2. Graphic Method for Determining Deflections in Beams.
Art. 3. Bending Moments, Shears and Deflections in Restrained Beams.
CHAPTER XVIII.—MAXIMUM BENDING MOMENTS AND SHEARS IN BEAMS FOR MOVING LOADS.

PART IV.—BRIDGES

CHAPTER XIX.—TYPES OF BRIDGE TRUSSES.
CHAPTER XX.—LOADS.
Art. 1. Dead Load.
Art. 2. Live Load.
Art. 3. Wind Load.
CHAPTER XXI.—STRESSES IN TRUSSES DUE TO UNIFORM LOADS.
Art. 1. Stresses in Warren Truss by Graphic Resolution.
Art. 2. Stresses in a Pratt Truss by Graphic Resolution.
Art. 3. Stresses by Graphic Moments and Shears.
Art. 4. Stresses in a Bowstring Truss—Triangular Web Bracing.
Art. 5. Stresses in a Parabolic Bowstring Truss.
Art. 6. Wind Load Stresses in Lateral Systems.
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DRAINAGE OF IRRIGATED LANDS IN THE SAN JOAQUIN VALLEY, CALIFORNIA.—By Samuel Fortier and Victor M. Cone. Bulletin 217, Office of Experiment Stations, U. S. Department of Agriculture; A. C. True, Director. Washington, D. C.: Pub. Doc. Paper; 6 x 9¼ ins.; pp. 58; two plates and nine text figures.

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FOREST PARK RESERVATION COMMISSION (New Jersey).—Annual Report for the Year Ending Oct. 31, 1908. (Alfred Gaskill, Trenton, Forester and Secretary.) Trenton, N. J.: Pub. Doc. Paper; 6 x 9 ins.; pp. 147; numerous plates and text illustrations.

GEOLOGIC ATLAS OF THE UNITED STATES.—U. S. Geological Survey, George Otis Smith, Director. No. 168: Jamestown-Tower Folio, Jamestown, Eckelson and Tower Quadrangles, North Dakota. By Daniel E. Willard. Washington, D. C.: Pub. Doc. Stiff paper; 18½ x 21¾ ins.; pp. 10; nine plates and six text figures.

GEOLOGICAL SURVEY OF NEW JERSEY.—Annual Report of the State Geologist for the Year 1908. (Henry B. Kümmel, State Geologist.) Trenton, N. J.: Pub. Doc. Boards; 5⅝ x 9 ins.; pp. 159; 21 plates and 6 text illustrations.

GYROSCOPIC THEORY OF THE MECHANICAL PART OF NATURE.—By Jno. Bunte, Machinist and Mechanical Engineer. Portsmouth, Va.: The Author. Paper; 5¼ x 8¼ ins.; pp. 24.

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INDIANA ENGINEERING SOCIETY.—Annual Report, and Proceedings of Annual Meeting Held at Indianapolis, Ind., Jan. 14-16, 1909. Indianapolis, Ind.: The Society (Charles Brossmann, Secy.). Paper; 5¾ x 9 ins.; pp. 332; plates and text illustrations.

IRON AND STEEL INDUSTRY.—Memorandum by the Government Mining Engineer of the Transvaal. (R. N. Kotze, Government Mining Engineer.) Pretoria, Transvaal: Pub. Doc. Paper; 6 x 9¾ ins.; pp. 14.

LOS ANGELES, CAL., THE CITY BEAUTIFUL.—Suggestions by Charles Mulford Robinson, Rochester, N. Y., Author of "Modern Civic Art," etc. (Report of the Municipal Art Commission for the City of Los Angeles, Cal., Made to the Mayor, City Council and Board of Public Works; F. W. Blanchard, President Commission.) Paper; 9¼ x 12 ins.; pp. 39; numerous text illustrations.

THE MINERAL CONTENT OF ILLINOIS WATERS.—By Edward Bartow, J. A. Udden, S. W. Parr and George T. Palmer. Bulletin No. 10, Illinois State Geological Survey; Prepared in Cooperation with the State Water Survey. Urbana, Ill.: University of Illinois. Cloth; 5¾ x 8¾ ins.; pp. 192; ten illustrations in the text.

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ORGANIZATION, WORK, AND PUBLICATIONS OF DRAINAGE INVESTIGATIONS.—Circular 88, Office of Experiment Stations, U. S. Department of Agriculture; A. C. True, Director. Washington, D. C.: Pub. Doc. Paper; 5⅜ x 9¼ ins.; pp. 6.

POWER, HEATING AND VENTILATION.—A Treatise for Designing and Constructing Engineers, Architects and Students. By Charles L. Hubbard, Consulting Engineer, Boston. Part I.: Equipment. Part II.: Power and Lighting. Part III.: Heating and Ventilation. Brattleboro, Vt.: The Technical Press. Cloth; 5¾ x 9 ins.; pp. 647; 412 illustrations in the text. $5.

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DIE REGELUNG DER KRAFTMASCHINEN.—Berechnung und Konstruktion der Schwungräder, des Massenausgleichs und der Kraftmaschinenregler in Elementarer Behandlung. By Max Tolle, Professor in the Technical College at Karlsruhe. Second edition, revised and enlarged. Berlin, Germany: Julius Springer. Leather; 6 x 9½ ins.; pp. 609; 19 plates and 403 text illustrations. 20 marks. American price, $10.50.

REPORT BY A SPECIAL BOARD OF ENGINEERS ON SURVEY OF MISSISSIPPI RIVER FROM ST. LOUIS, MO., TO ITS MOUTH.—With a View to Obtaining a Channel 14 Ft. Deep and of Suitable Width, Including a Consideration of the Survey of a Proposed Waterway from Chicago, Ill., to St. Louis, Mo., Heretofore Reported upon. Submitted by the Chief of Engineers to the Secretary of War. (W. L. Marshall, Chief of Engineers, U. S. Army.) Document No. 50, House of Representatives. Washington, D. C.: Pub. Doc. Paper; 5⅜ x 9¼ ins.; pp. 532.

STATE RIVERS AND WATER SUPPLY COMMISSION (Victoria, Australia).—Policy to be Followed in Irrigation Development. No. 2. Statement by Hon. George Graham, Minister of Water Supply. Melbourne, Victoria: Pub. Doc. Paper; 8¼ x 13 ins.; pp. 20.

STRUCTURAL DETAILS.—Or Elements of Design in Heavy Framing. By Henry S. Jacoby, Professor of Bridge Engineering in Cornell University. New York: John Wiley & Sons. London, England: Chapman & Hall, Ltd. Cloth; 5¾ x 9¼ ins.; pp. 368; six folding plates and numerous text illustrations. $2.25, net. English price, 9s. 6d., net.

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TELEGRAPH SYSTEMS: 1907.—Bulletin 102, Bureau of the Census; S. N. D. North, Director. Washington, D. C.: Pub. Doc. Paper; 9 x 11½ ins.; pp. 47; eight plates and one text figure.

THE WORKMEN'S COMPENSATION ACT, 1906.—By V. R. Aronson, M. A., B. C. L., of the Inner Temple and Midland Circuit, Barrister-at-Law. London and Leipsic: T. Fisher Unwin. Cloth; 5¼ x 9 ins.; pp. 238. 15s., net; American price, $6, net.


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